Prior Art aldehyde scavengers typically include low molecular weight aldehydes and ketones and adducts thereof. The low molecular weight aldehydes may also be combined with an alkyl or alkanolamine as disclosed in US Patent 4,748,011. Other aldehyde derived scavengers include the reaction product of low molecular weight alkanolamines and aldehydes as disclosed in US Patent 4,978,512. PCT Application WO 92/01481 discloses a method of reducing sulfides in different applications using certain tri-substituted-hexahydro-s-triazines. German reference DE4027300 discloses a regenerative solvent for removing H_2S and mercaptans. US Patent 5,347,004 discloses the use of 1,3,5 alkoxyalkylene hexahydro triazines. PCT Application WO 91 US 5232 discloses hydroxyalkyl triazine scavengers, specifically an N,N',N"-tris(2-hydroxyethyl)hexahydro-s-triazine. US Patent 5,774,024 discloses the combination of an alkyl triazine scavenger and quaternary ammonium salt, where the quaternary ammonium salt enhances the effectiveness of the alkyl-triazine.. These prior art attempts however are frequently water-based chemicals and require significant mixing to allow the scavenger to effectively contact the hydrocarbon fluid and remove the hydrogen sulfide.

Thus there is clear need and utility for an improved method of scavenging hydrogen sulfide from hydrocarbon fluids using scavengers that are soluble in the fluid that is being treated. The art described in this section is not intended to constitute an admission that any patent, publication or other information referred to herein is "prior art" with respect to this invention, unless specifically designated as such. In addition, this section should not be construed to mean that a search has been made or that no other pertinent information as defined in 37 CFR § 1.56(a) exists.

Brief Summary ~~of the Invention~~

At least one embodiment of the present disclosure~~invention~~ is directed towards a method for

removing hydrogen sulfide from a hydrocarbon fluid. The method comprises contacting the fluid with an effective amount of a composition comprising a hydrogen sulfide scavenger. The amount of hydrogen sulfide scavenger is sufficient to react with the hydrogen sulfide to reduce the amount hydrogen sulfide released into the vapor space . The reaction product of the hydrogen sulfide scavenger and the hydrogen sulfide remain soluble in the hydrocarbon fluid. The hydrogen sulfide scavenger contains at least one alpha-amino ether.

In an aspect, there is provided a method of reducing the amount of hydrogen sulfide in a hydrocarbon fluid by contacting that fluid with an effective amount of a composition comprising a hydrogen sulfide scavenger, wherein the amount of hydrogen sulfide scavenger is sufficient to react with the hydrogen sulfide to reduce the hydrogen sulfide found in the vapor phase, the reaction product of the hydrogen sulfide scavenger and the hydrogen sulfide remain soluble in the hydrocarbon fluid, the hydrogen sulfide scavenger contains at least one alpha-amino ether.

The composition may include one item selected from the list consisting of:

N,N'-oxybis(methylene)bis(N,N-dibutylamine),

N,N'-(methylenebis(oxy)bis(methylene))bis(N,N-dibutylamine),

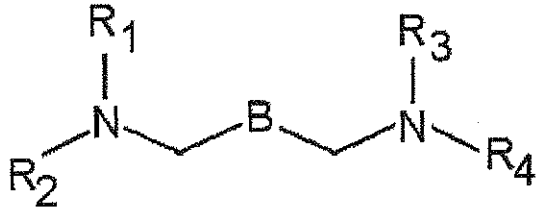
and any combination thereof.

The reaction product of the sulfide scavenging formulation and the hydrogen sulfide may not form a separate fluid layer. The method may also further comprise the step of reacting a secondary amine with a formaldehyde equivalent to form at least some of the scavenging formulation. The hydrocarbon fluid may be a liquid.

Detailed Description of the Invention

For purposes of this application the definition of these terms is as follows:

"Alpha-amino ether" means a molecule according to the formula:



Where: R_1, R_2, R_3, R_4, are carbon containing side chains containing 1 – 20 carbon atoms and includes cyclic and acyclic compounds. The cyclic compounds can be aromatic or non-aromatic.